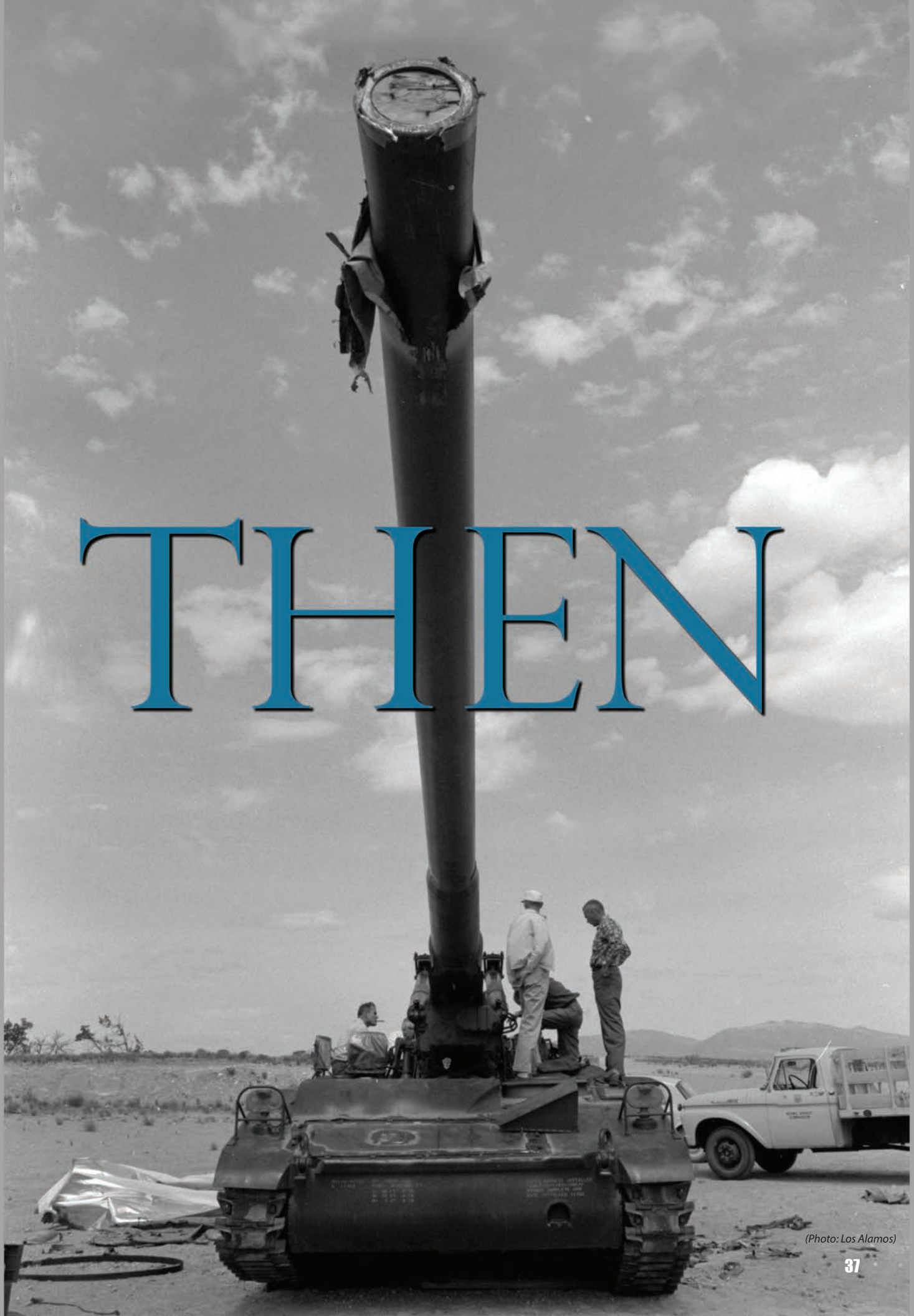


(Photo: Los Alamos)

(Photo: Los Alamos)

(Photo: Los Alamos)

(Photo: Los Alamos)

Since its inception in 1943, the Laboratory has done experiments to understand shock and detonation physics and the reactions of nuclear weapon materials to shock waves and other extreme impacts.

These black-and-white photographs, taken at a Laboratory testing site 50 years ago (on the Lab's 20-year anniversary in 1963) show a variety of cannons used for these experiments. The cannons would fire experimental projectiles of various types and materials into targets positioned in front of berms (large "catcher boxes") filled with, for example, soil, wood chips, and vermiculite. The berms captured the projectiles and targets, which could then be retrieved and studied.

NOW

Photographs celebrating the Laboratory's past and present

Firing cannons outdoors ended in 1972, but the Lab is still doing this same kind of research on nuclear weapon materials.

Today the Lab uses "gas guns" situated inside specially designed laboratories. Gas guns, like the one shown below, use a non-gunpowder-based, high-pressure gas to fire modern projectiles into modern catcher boxes that, like decades ago, permit the projectiles and targets to be retrieved and studied.

(Photos: Los Alamos)

(Photo: Los Alamos)

(Photo: Los Alamos)

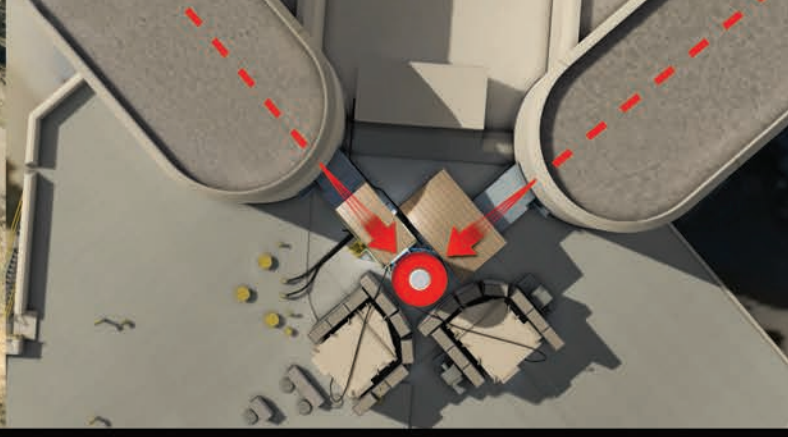
(Photo: Los Alamos)

THEN &

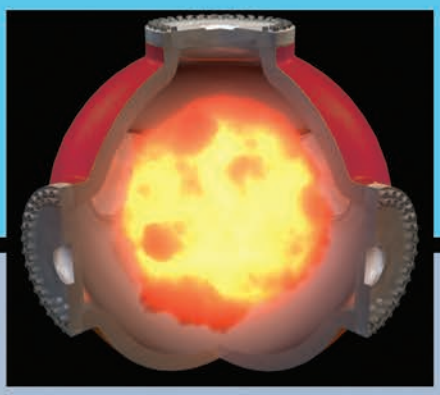
Experiments using high explosives produced brilliant fireballs in front of the metal bunker that was home to PHERMEX (Pulsed High-Energy Radiographic Machine Emitting X-Rays), the nation's premier radiographic test facility during the Cold War. PHERMEX generated bursts of x-rays needed to take a series ("movie") of high-speed pictures (radiographs) of implosion experiments that mimicked the implosion of a nuclear weapon's nuclear-fuel core. The radiographs recorded what was happening.

In a real nuclear weapon, high explosives produce the pressures needed for an implosion to force the fuel into its supercritical phase—uncontrolled fission—resulting in a nuclear explosion. However, before reaching supercriticality, the core materials actually melt and flow like fluids; consequently, experiments that mimic this implosion process are called hydrodynamic tests, or hydrotests. Radiographs of the fluid's behaviors are critical to understanding weapon performance.

Los Alamos National Laboratory



NOW



After more than 40 years and 1,000 hydrotests, in 1999 PHERMEX was replaced by the Dual-Axis Radiographic Hydrodynamic Test facility (DARHT), one of the world's most powerful x-ray machines. At DARHT two x-ray beams, aimed at right angles to each other, create radiographs for 3D images of implosions. One of DARHT's beams produces four sequential high-resolution radiographs that form, in effect, a short "movie" of the implosion. Each implosion at DARHT takes place safely inside a giant containment vessel like the one shown below.

(Photo: Los Alamos)